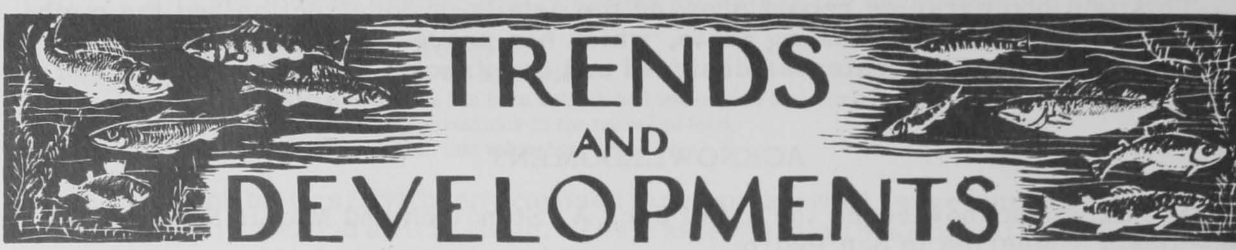


Antibiotics in Food Industry Discussed at Symposium

The Fourth Annual Symposium on Antibiotics sponsored by the U. S. Department of Health, Education, and Welfare was held in Washington, D. C., on October 17, 18, and 19. While the principal emphasis in 136 papers was on the medical aspects of antibiotics in general, 18 papers were presented by representatives from antibiotics manufacturers, universities, government agencies, and others covering present and potential applications of certain antibiotics in extending fresh food storage life. Pertinent points of the food papers are as follows:

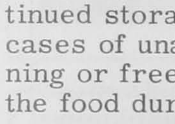
Aureomycin and terramycin apparently have the widest range of usefulness of any of the antibiotics in the food industry because of their effectiveness in inhibiting the growth of bacteria. Indications are that they are relatively nontoxic, and are destroyed in the usual cooking procedures such as boiling, frying, or baking.

Aureomycin (chlortetracycline) is now being used commercially to extend the refrigerated life of fresh poultry. The U. S. Food and Drug Administration has established a maximum tolerance of 7 p.p.m. for residues of aureomycin in or on uncooked poultry. Terramycin (oxytetracycline) has been released also for use in poultry under the same conditions. Commercial usage is controlled by the antibiotic supplier under a franchise program which demands high sanitary standards on the part of the food processor before the antibiotic is supplied.

Reports also indicate potential application of the antibiotics in extending the shelf life of other refrigerated foods, such as fresh and cured meats, fish, and shellfish. The method of applying the antibiotic is by dip, spray, ice, animal injections, or infusion of the carcass. However, at the present time the Food and Drug Administration has not sanctioned any commercial application to food items other than poultry. Also, it was stressed that the use of antibiotics is not a panacea. The antibiotics under consideration exert their effects only on bacterial populations. They do not control the growth of yeasts or molds nor do they prevent non-microbial changes in foods such as those produced by enzymes, oxidation, etc.

Since these antibiotics are destroyed by heat and also disappear during continued storage, they have no direct value in the permanent preservation of food. In cases of unavoidable delay between the harvest of food and its preservation by canning or freezing, the use of such antibiotics might prevent undesirable changes in the food during a reasonable period of time.

Cans--Shipments for Fishery Products, January-August 1956



Total shipments of metal cans during January-August amounted to 77,154 short tons of steel (based on the amount of steel consumed in the manufacture of cans) as compared with 67,214 tons in the same period of 1955. The month of August generally marks the peak month of the packing season for many fishery products. The packs of tuna, Maine sardines, and salmon in 1956 will all exceed the 1955 packs.

Note: Statistics cover all commercial and captive plants known to be producing metal cans. Reported in base boxes of steel consumed in the manufacture of cans, the data for fishery products are converted to tons by using the factor: 23.0 base boxes of steel equal one short ton of steel.

△△△△△△

California

ALBACORE TUNA TAGGED OFF SOUTHERN CALIFORNIA (M/V *Nautilus* Cruise 56-N-2): A total of 360 albacore and 9 bluefin tuna were tagged during a cruise (M/V *Nautilus*' cruise 2) from August 14 to September 6, 1956, by California Department of Fish and Game biologists. The objectives of the cruise where to tag albacore with type G "spagetti" tags as part of a study of migrations and growth; to determine the relationship between tag color and tag recovery; and to make physical and biological observations related to the occurrence of albacore. The tags were colored red, white, and blue and approximately an equal number of each color was used.

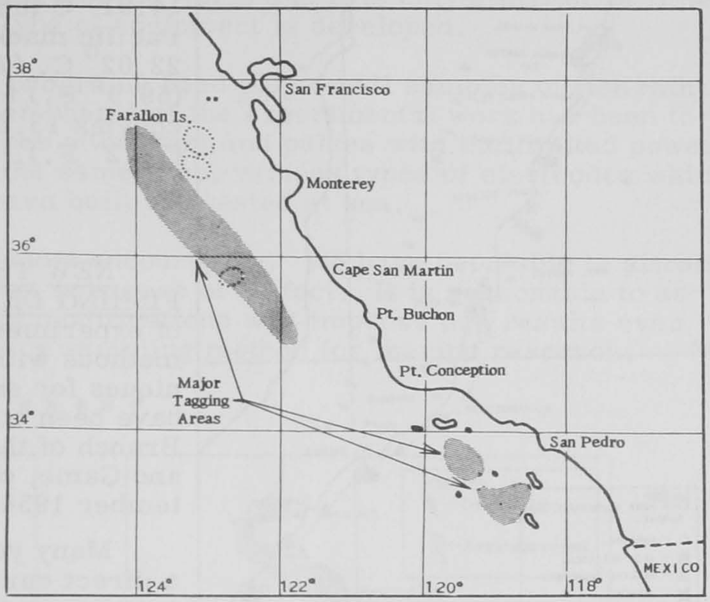


Fig. 1 - Albacore tagging M/V *Nautilus* cruise 56-N-2 (Aug. 14-Sept. 6, 1956).

Three albacore and one bluefin tuna were subsequently recovered as follows: one albacore recovered six days after tagging, about 27 miles E. by S. of the release location; the second 41 days after tagging, about 116 miles NNW. of the releasing point; and the third soon after tagging at the point of release. The bluefin tuna was recovered 25 days later, 17 miles SW. of the releasing location.

The areas fished had surface water temperatures ranging between 58.3° F. and 68.2° F. Examinations of all untagged albacore revealed different types of food for the various fishing areas. Fish from the Santa Cruz Basin were feeding heavily on squid and those from the Outer Santa Barbara Channel and the northern area had been feeding on sauries (*Cololabis saira*). A large percentage of the albacore examined had empty stomachs.

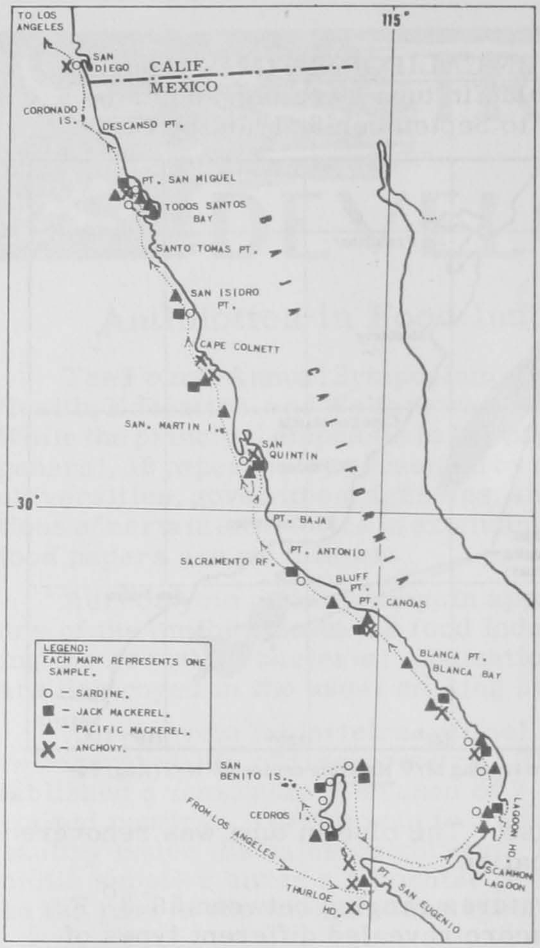
In addition to the albacore and bluefin tuna, specimens of rockfishes (*Sebastodes*) were taken at Osborne Banks, San Clemente Island, and Santa Barbara Island, and sauries were commonly found under the night light in all offshore areas.

* * * * *

ABUNDANCE SURVEY OF SARDINES, JACK AND PACIFIC MACKEREL, AND ANCHOVIES CONTINUED BY M/V "SCOFIELD" (Cruise 5): The second of five cruises along the Baja California coast from Turtle Bay to the Mexican border for the purpose of assessing the relative abundance of Pacific sardines, Pacific mackerel, jack mackerel, and anchovies was made by California's Department of Fish and Game research vessel *N. B. Scofield*. The cruise began on August 24 and ended on September 13, 1956.

During the cruise 78 light stations were occupied. Pacific sardines were sampled at 14 stations, Pacific mackerel at 19, jack mackerel at 12, and anchovies at 11.

The vessel traveled a total of 490 fish-scouting miles--196 schools were observed visually, of which 17 were Pacific sardines, 81 Pacific mackerel, 32 anchovies, and 66 were unknown. Hydrographic data was collected at all night-light stations.



M/V Scofield Cruise 5 (Aug. 24-Sept. 13, 1956).

Surface temperatures encountered on the cruise ranged from 13.55° C. (56.4° F.) at Pta. San Jose, to 23.45° C. (74.2° F.) in Turtle Bay. Fish were sampled in the following temperature ranges: Pacific sardine 14.91° C (58.8° F.) to 23.45° C. (74.2° F.), Pacific mackerel 14.00° C. (57.2° F.) to 22.02° C. (71.6° F.), jack mackerel 15.27° C. (59.5° F.) to 20.60° C. (69.1° F.), and anchovies 13.80° C. (56.8° F.) to 23.45° C. (74.2° F.).

* * * * *

NEW TECHNIQUES IN OCEAN ELECTRO-FISHING DEVELOPED: A preliminary series of experiments in electro-fishing devices and methods with a view of developing new techniques for sampling populations of marine fish have been completed by the Marine Fisheries Branch of the California Department of Fish and Game, points out the Department's September 1956 issue of Outdoor California.

Many years ago it was demonstrated that a direct current passed through the water between two electrodes will bring about some startling reactions in fish caught swimming between the electrodes. First of all, if the current is sufficiently strong, the fish will line up along the path of the current with their heads pointing toward the positive electrode. Secondly, if the current is pulsed or repeatedly interrupted, each pulse will cause the muscles of the fish to contract involuntarily.

A "trouser leg" electrode. The fish are attracted to the wire mesh when the current is turned on. Once the fish are in, the webbing at the bottom is pulled up preventing their escape. In the photo, a portion of the Pacific mackerel and anchovies were attracted with such force that they became solidly wedged into the wire mesh of the electrode.

These muscle contractions propel the fish through the water toward the positive electrode where they can be easily picked up or directed into some appropriate catching devide. As long as the current is on, the movement of the fish is beyond his control--he cannot escape. It is of interest that the attracting power of a current is inversely proportional to the size of the fish and a given current will more readily attract a large fish than it will a small one.

Electro-fishing has been used with great success in stream survey work by the Department's Inland Fisheries Branch as well as by other fresh water agencies. Unfortunately, the problems of handling electric current in the ocean are enormously more difficult than in fresh water.

Because of the very high conductivity of salt water, almost a direct short circuit is produced, and the current would rather travel in all directions through the water than it would through the fish. This necessitates the use of extremely high amounts of current in order to affect the fish. However, the problem is being tackled independently in many countries of the world and it is only a matter of time before an economical and effective type of equipment is developed.

Since the Department's survey programs need only small samples of fish rather than commercial quantities, the emphasis of the experimental work has been toward obtaining the most efficient types of current and pulses with the limited power available on research vessels. At the same time, various types of electrodes which incorporate catching devices have been built and tested at sea.

Thus far the results have been most encouraging. We have been able to attract and capture small fish from distances in excess of 20 feet. It is reasonable to assume that continued experiments and modifications will improve our results even more and give us a truly revolutionary sampling method for marine research.

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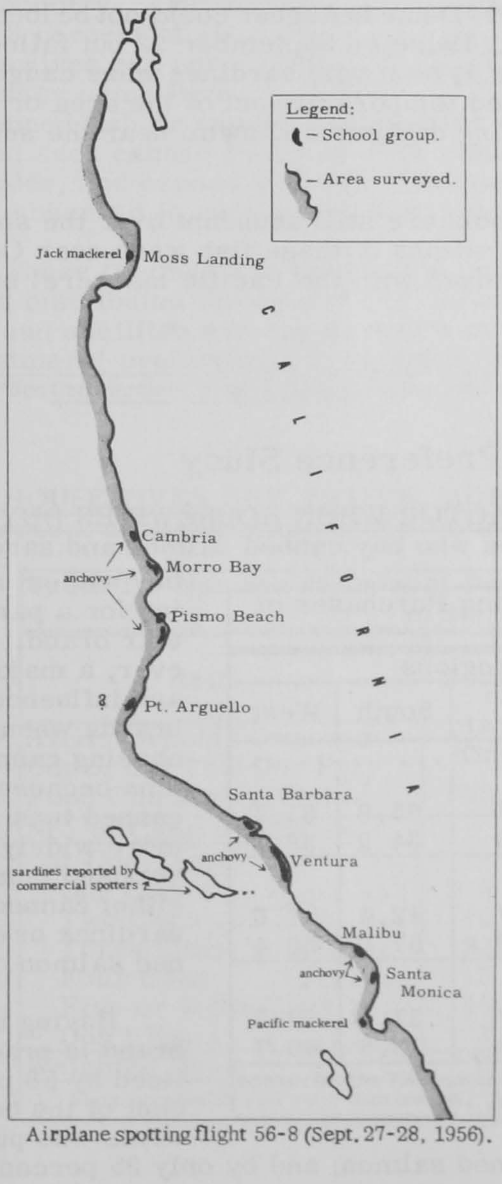
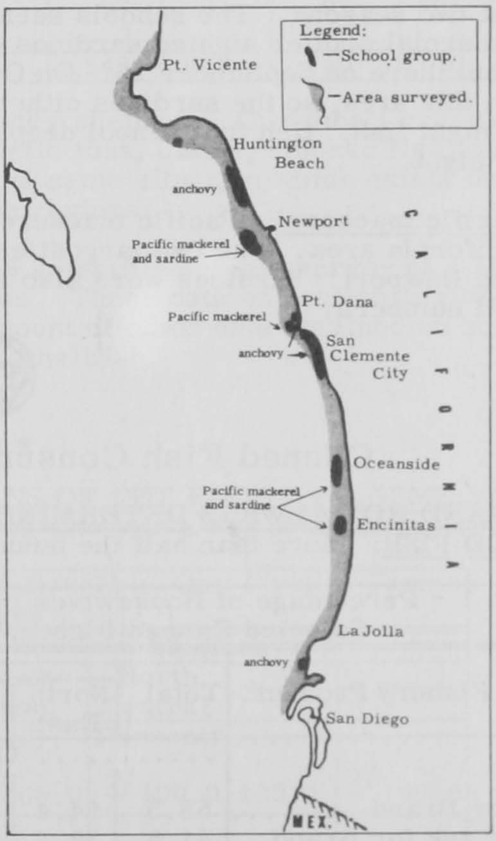


Airplane spotting flight 56-8 (Sept. 27-28, 1956).



Airplane spotting flight 56-8 (Sept. 29, 1956).

<u>PELAGIC FISH DISTRIBUTION STUDY</u> (Airplane Spotting Flight 56-8): In order to continue the study of pelagic fish distribution, abundance, and behavior in central and southern California, that State's Department of Fish and Game operated an airplane spotting flight September 27-29, 1956. The survey was in the inshore area between Half Moon and Pt. Loma, Calif.

Anchovy schools increased in abundance to the south of San Simeon, but decreased in abundance in Monterey Bay since the last flight in August. In comparison with the past two seasons Pacific mackerel continue to be more abundant, but sardines are apparently less numerous and more widely distributed. Except for fog around San Francisco and off the Coronado Strand, clear skies and calm seas prevailed.

Anchovy: No anchovy schools were seen in the area between Half Moon Bay and Cambria. Apparently the spawning adult fish present in Monterey Bay earlier in the month (data gathered from commercial catch sampling) have either moved out of the inshore area or are now schooling deeply and cannot be seen in the daytime.

In southern California and in the central California area from Cambria to Pt. Arguello there has been a decided increase since August in the total area of anchovy schools. The greatest increases occurred near Pismo Beach, Huntington Beach, and San Clemente City. A total of 568 schools (11,689,200 square feet) were tallied in each 10-mile section of the coast in which anchovies were found.

Sardine: Fewer sardines were observed from the air this season than during the past two seasons. The schools seen off Pt. Dume in August could not be located. A commercial spotter sighted sardines off Pt. Dume on September 22 but failed to find them there on September 26. On October 1, however, sardines were caught at night in this area, so the sardines either moved temporarily out of the area or became "night fish," fish that school deeply during daytime and swim near the surface at night.

Pacific mackerel: Pacific mackerel schools are still abundant over the southern California area. The two largest concentrations of these fish were near Oceanside and Newport. Sardines were also seen mixed with the Pacific mackerel but in small numbers.

Canned Fish Consumer Preference Study

BRAND NOT ALWAYS DETERMINING FACTOR WHEN HOUSEWIVES BUY CANNED FISH: More than half the housewives who buy canned salmon and sardines buy without asking for a particular brand. However, a majority are influenced by brands when purchasing canned tuna because canned tuna is more widely advertised than either canned sardines or canned salmon.

Table 1 - Percentage of Housewives Indicating Purchases of Selected Canned Fish by Brand

Canned Fishery Product	Total	Regions: North East	North Central	South	West
	....	....	(Percent)	....	....
Tuna 1/					
Ask for Brand	58.5	64.4	54.7	65.8	61.7
Do not ask for Brand ..	41.5	35.6	45.3	34.2	38.3
Salmon 1/					
Ask for Brand	41.4	50.1	35.7	42.4	37.6
Do not ask for Brand ..	58.6	49.9	64.3	57.6	62.4
Sardines 1/					
Ask for Brand	34.9	46.1	31.7	27.4	39.3
Do not ask for Brand ..	65.1	53.9	68.3	72.6	60.7

1/ Of 2,700 households covered in the survey, 2,109 served canned tuna, 1,907 served canned salmon, and 1,394 served canned sardines.

Buying by brand is practiced by 58 percent of the housewives who purchase canned tuna; by 41 percent who buy canned salmon; and by only 35 percent who buy sardines. These facts were brought out by a recent nationwide sample survey of households.

In general, the practice of buying canned fish by brand name is more prevalent in the Northeast region and least in the North Central region.

These findings, which are based on a June 1956 scientific sample survey of 2,700 households distributed throughout the United States, are a part of other data obtained on household consumers' preferences for canned fish and shellfish.

Note: See Commercial Fisheries Review, August 1956, p. 47.

* * * * *

CANNED FISH AND SHELLFISH GENERALLY AVAILABLE AT RETAIL: Practically every housewife (97 percent) in the United States can purchase any item of canned fish or canned shellfish she wishes at retail. This is the result of the effective functioning of the distribution system in this country. Only about 3 percent of all housewives can not purchase some item of canned fish or canned shellfish for which they shopped. This small group mentioned such canned items as crab meat, dietetic tuna, clams, smoked fish, clam chowder, and canned whiting. Practically the same situation which exists nationally is observed in each of the four geographic regions.

Table 1 - Percentage of Households Indicating if Items of Canned Fish or Shellfish are Available at Retail

	United States	Northeast	Central	South	West
	.... (Percent)				
Usually Available....	97	97	97	97	94
Not Available	3	3	3	3	6
No. of Households ...	2,545	679	730	770	366

These findings are based on a June 1956 scientific sample survey of 2,700 households distributed throughout the United States. These data on availability of canned fish and shellfish are one part of a large amount of other data obtained on household consumers' preferences for canned fish and shellfish.

Note: See Commercial Fisheries Review, August 1956, p. 47.

* * * * *

HOUSEWIVES BUY TWO OR MORE CANS OF PET FOOD AT A TIME: About 95 percent of the families in the United States who own a dog or a cat buy two or

Table 1 - Number of Cans of Pet Food Bought at One Time in Terms of Percentages

Item	Total	Regions			
		Northeast	North Central	South	West
All Households Owning a Dog or Cat That Use Pet Food Containing Fish 1/	.... (Percent) 100.0	2/ 100.0	2/ 100.0	100.0	2/ 100.0
No. of Cans Purchased at One Time:					
One Can	5.3	4.8	7.7	3.6	5.8
Two Cans	10.5	14.5	12.1	9.5	5.8
Three Cans..........	22.9	27.7	19.8	21.2	24.6
Four Cans...........	15.2	12.0	18.7	16.8	11.6
Five or More Cans	45.0	41.0	40.6	48.2	49.3
Don't Know	1.1	-	1.1	0.7	2.9
Weighted Base	380	83	91	137	69

1/ Some households own more than one pet. 2/ Relatively unstable due to the small number of cases.

more cans of pet food at a time. Forty-five percent of the pet owners usually purchase five or more cans. Another 15 percent usually buy in units of four. About one in every three families in the United States owns a dog and one out of five families owns a cat.

These findings are based on a recent scientific sample survey of household consumers' preferences for canned fish and shellfish which was conducted among 2,700 households distributed throughout the United States. One of the objectives of the survey was to determine the most frequent answer to the question "How many cans of pet food do you usually buy at one time?"

The responses indicate that it might be advisable for processors to consider packaging cans of pet food in handy containers holding more than one can.

Final results of the survey, which is being financed by funds provided by the Saltonstall-Kennedy Act of 1954, are scheduled for publication the early part of next year. The Fish and Wildlife Service contracted with W. R. Simmons and Associates Research, Inc., New York City, to conduct the survey.

Federal Purchases of Fishery Products

Fig. 1 - Canned Fishery Products Purchased Through Quartermaster Market Centers, January-September 1956

Period	Tuna	Salmon	Sardines
	. . . (1,000 Pounds) . . .		
Jan-Sept.	2,227	601	231

CANNED FISHERY PRODUCTS PURCHASED THROUGH QUARTERMASTER MARKET CENTERS, JULY-SEPTEMBER 1956: Only insignificant amounts of canned tuna and sardines were purchased for the use of the U. S. Army, Navy, Marine Corps, and Air Force by the Army Quartermaster Corps through its Market Centers during the third quarter of 1956. Purchases amounted to 39,000 pounds of canned tuna and 4,000 pounds of canned sardines. No canned salmon was purchased.

Note: Also see Commercial Fisheries Review, October 1956, p. 15.

* * * * *

FRESH AND FROZEN FISHERY PRODUCTS PURCHASED BY THE DEPARTMENT OF DEFENSE, SEPTEMBER 1956: The Army Quartermaster Corps in September 1956 purchased about 2 million pounds (valued at $996,628) of fresh and frozen fishery products for the use of the Army, Navy, Marine Corps, and Air Force. This was 31.5 percent less in quantity and 29.0 percent less in value than the purchases made in August 1956, but higher by 8.8 percent in quantity and 20.7 percent in value than purchases made in September 1955.

Purchases of Fresh and Frozen Fishery Products by Department of Defense (September and the First Nine Months of 1956 with Comparisons)

QUANTITY				VALUE			
Sept.		Jan.-Sept.		Sept.		Jan.-Sept.	
1956	1955	1956	1955	1956	1955	1956	1955
. . . . (1,000 Pounds)				. . . . ($1,000)			
1,958	1,799	20,232	19,257	997	826	10,105	8,296

Purchases of fresh and frozen fishery products during the first nine months of 1956 totaled 20.2 million pounds (valued at $10,104,809)--an increase of 5.1 percent in quantity and 20.7 percent in value than purchases made during the same nine months in 1955.

Prices paid for these fishery products averaged 50.9 cents a pound in September 1956 as compared with 49.1 cents a pound the previous month and 45.9 cents a pound in September 1955.

* * * * *

NEW AGENCY REPLACES QUARTERMASTER MARKET CENTER SYSTEM: As a major step towards activating the single manager subsistence program, the Military Subsistence Supply Agency (MSSA) was established, effective October 26, 1956, to replace the Quartermaster Market Center System.

The new organization effects the following changes: (1) Quartermaster Market Center System, 226 West Jackson Blvd., Chicago 6, Ill., changed to Headquarters, Military Subsistence Supply Agency at the same address; (2) the Quartermaster Market Centers changed to Military Subsistence Market Centers.

The new organization will be somewhat limited in functions until the completion of transfer of the Quartermaster Inspection Service Command and some other food distribution services. All military subsistence supply has now been brought under the jurisdiction of the new organization.

Fish Sticks First to Bear U. S. Shield and Grade Labelling

The first fishery product ever to bear the U. S. shield and grade labelling, indicative of voluntary continuous in-plant inspection and grading, is now available on the market. This is the consummation of the work of U. S. Fish and Wildlife Service technologists working on frozen fried fish sticks in cooperation with members of the fishing industry and with the National Fisheries Institute. The U. S. Department of Agriculture, using the standards and inspection manuals developed by the Department of Interior's Fish and Wildlife Service, now makes this inspection and grading service available to the industry. Three plants processing fish sticks are now under continuous inspection. Other specific lots of fish sticks are now being graded at the request of prospective buyers.

The Service is continuing its work on the development of standards for the fishing industry. It is planned that similar proposed standards, now well-advanced, for frozen fish fillet blocks and for raw breaded fish portions will be published in from three to five months. Thus, a complete set of interrelated standards will soon be available for use in a grading service from the raw material stage to the important heat-and-serve products of one segment of the fishing industry.

Georges Bank Hydrographic Resurvey Planned

A resurvey of Georges Bank, off the Massachusetts coast, an area which is considered by the New England commercial fishing industry as its most important economic asset, will be made by the U. S. Coast and Geodetic Survey, the Secretary of Commerce announced October 30, 1956.

Such a survey of the famous shoals area, the first in 25 years, is needed, the Secretary said, to provide more accurate hydrographic information for the North

Atlantic fishing fleet and a detailed survey in the vicinity of the first Air Force-operated Texas Tower, radar warning station of the Air Defense Command, located at Georges Bank.

The Coast and Geodetic Survey Ship Hydrographer, which has been operating this past year in the Straits of Florida and the Caribbean, is preparing to shift its operations to Georges Bank in March of 1957. It is hoped that the project can be completed within a single surveying season, ending about October 1. The 67-foot Hydrographer has a complement of 65 officers and men, plus occasional extra technicians.

Commercial fishing industry spokesmen have advised the Department of Commerce that fish production from the Georges Bank area is particularly vital to the fishing industry of Boston. Other ports, such as Gloucester and New Bedford, depend heavily on this bank for a constant supply of fish.

In addition to the periodic inspections and checks made by the Coast and Geodetic Survey, many fishing skippers and boat owners in recent years have been reporting evidence of a series of major changes in the shoals and channels of the Georges Bank area which they believe could be of serious import to normal fishery activities. These reported changes have created much anxiety and apprehension among all fish producers, and it is believed that the forthcoming new survey will prove of extreme value to them.

Coast and Geodetic Survey officials also are contemplating the possibility of a partial resurvey of the Nantucket area, where the next Texas Tower is to operate, after the completion of the Georges Bank hydrographic study. The Nantucket area was last surveyed in detail during 1940.

The survey of the Georges Bank area, beginning about 60 miles east of Cape Cod, will cover about 4,600 nautical square miles of Atlantic Ocean bottom, resulting in greatly improved charts for the safety of navigation and the fishermen's operations there.

The Radio Accoustic Ranging System, used when the existing Coast and Geodetic Survey charts for Georges Bank were first published in 1931-32, is now obsolete. Much more modern and accurate methods are now employed, notably the Electronics Position Indicator System.

Equipped with this system, a combination of features of Loran and Shoran, the Hydrographer two years ago made a new survey of Brown's Bank, off Nova Scotia, another area used extensively by the fishing fleet. Such surveys contribute not only to the development of maritime resources and especially aid the fishing industry, but they also assist in meeting national defense planning needs.

The Hydrographer was one of four Coast and Geodetic Survey ships which made thousands of soundings and took numerous samples of ocean bottom deposits in conducting the Goerges Bank survey of the early Thirties. The charts and other data thus produced developed a wealth of detail of great value to the fishing industry. Deep gorges or valleys, some more than 150 fathoms deep, were discovered on the eastern and southern profiles of Georges Bank, and information about bottom characteristics proved another important factor in the carrying out of fishing operations, not only in regard to navigation but also in the study of the movement of fish.

With the recent evidences of changes in ocean bottom in the Georges Bank area, the forthcoming new survey is designed to bring all charts up to date and supply additional data to assist the fishermen and operators of both small and large vessels who ply the waters there.

The survey ship which will be used to make the Georges Bank survey has been engaged in its unique type of duty since she was launched at Portsmouth, Virginia, in 1929. The 1100-ton *Hydrographer* has had her outer appearance changed several times through the years as she has been re-equipped to keep her abreast of scientific advances and service. She has two 26-foot power launches which permit her crew to survey shoal areas too shallow to accommodate the mother ship.

Great Lakes Fishery Investigations

SURVEY OF SAGINAW BAY CONTINUED BY M/V "CISCO" (Cruise 7): Experimental fishing during a cruise by the Service's research vessel *Cisco* from October 2-5, 1956, was confined to Saginaw Bay. Considerable trawling was done in a very shallow area near the southwest end of the Bay. This area had not been visited before, since weather conditions need to be ideal for the *Cisco* to venture into such shoal water. Yellow perch (*Perca flavescens*) fingerlings were numerous, and alewife fingerlings (*Pomolobus pseudoharengus*) were extremely abundant. About 6,000 of the latter species, ranging in length from 1.5 to 3.0 inches, were taken in a 35-foot trawl in one 5-minute bottom tow, and 8,500 were caught in a 5-minute tow just off the bottom. Smelt (*Osmerus mordax*) fry were almost as plentiful as the alewives off the bottom, but not nearly so numerous on the bottom. Small numbers of young-of-year black crappies (*Pomoxis nigromaculatus*) and bluegills (*Lepomis macrochirus*) were also caught in the shallow water. Trawling operations were also carried out in 6 to 11 fathoms off East Tawas. Catches consisted mostly of perch and smelt fry. Most of the adult smelt appear to have left this portion of the Bay; probably a seasonal movement. Night trawling studies were carried out in the area north and west of Charity Island. Midwater tows and bottom tows in the shallower ($3\frac{1}{2}$-4 fathoms) waters caught only a few perch and smelt fry, but one 5-minute bottom drag with a 35-foot net in deeper water (11 fathoms) took nearly 1,800 perch.

Gill nets were set obliquely from surface to bottom off East Tawas in 13 and 26 fathoms of water, and a bull net (300 feet long, 120 meshes deep) was set at the latter depth. Nothing was taken at the shallower depth. The deeper oblique set caught only a few bloaters (*Leucichthys hoyi*), longjaws (*Leucichthys alpenae*), and smelt. The fish were concentrated between 80 and 140 feet under the surface. The bull net was set so that its float line was just above the thermocline at 120 feet, and its lead line was beneath the thermocline at 140 feet. It caught 120 bloaters, 2 longjaws, and 41 smelt in an overnight set. Lake herring (*Leucichthys artedi*) have apparently not yet entered the Bay in any numbers for spawning, since none of this species was caught.

A gill net ($2\frac{1}{4}$-, $2\frac{1}{2}$-, $2\frac{3}{4}$-, 3-, and 4-inch mesh) set on the bottom in the harbor just off East Tawas in $4\frac{1}{2}$-5 fathoms of water caught 168 medium-size perch. The catch also included two walleyes (*Stizostedion vitreum*), one white bass (*Lepibema chrysops*), and 24 white suckers (*Catostomus commersoni*).

Hydrographic transects were run from Bay City to East Tawas, East Tawas to Harbor Beach, East Tawas to Oak Point, and Hat Point to Au Sable Point. Surface water temperatures are continuing to drop and the epilimnion has become about 125 feet thick. Surface water temperatures ranged from 10.8° C. (51.4° F.) to 15.4° C. (59.7° F.).

Hawaii

COMMERCIAL FISHERIES CATCH FOR 1955: The landings in 1955 of ocean-caught fish and shellfish by the commercial fishermen of the Territory of Hawaii amounted to 15.4 million pounds, valued at \$3.1 million, according to a statistical summary from the Hawaiian Division of Fish and Game. This total was lower by 5.2 million pounds, or 25.2 percent, in weight and \$0.6 million, or 15.3 percent, in value than the previous year. The decrease in the 1955 catch was due largely to the skipjack catch which declined 4.3 million pounds (30.9 percent) from the 14 million pounds reported for this species in 1954. The catch of some other important species was also down from 1954--yellowfin tuna down 15.2 percent, big-eyed tuna lower by 21.9 percent, black marlin down 41.1 percent, and big-eyed scad 6 percent lower. However, there were some increases in the catch of striped marlin, dolphin, and pink snappers. The value of the ocean catch in 1955 declined only 8.5 percent as compared with the 1954 value of \$3.7 million, due to higher ex-vessel prices for some important varieties, particularly yellowfin and big-eyed tuna, which brought an average of \$0.318 a pound in 1955 as compared with \$0.246 a pound in 1954. In addition to the ocean catch, 106,868 pounds, valued at \$68,566, of pond fish were reported as compared with 86,000 pounds, valued at \$55,000 dollars in 1954.

Table 1 - Hawaiian Commercial Fish Catch and Value by Species, 1955 and 1954

Species		1955		1954 1/	
English	Hawaiian	Quantity 1,000 Lbs.	Value \$1,000	Quantity 1,000 Lbs.	Value \$1,000
Ocean Catch:					
Amberjack	Kahala	83	17	68	13
Big-eyed scad	Akule	304	192	324	205
Dolphin	Mahamahi	265	86	236	77
Goatfish	Weke-ula, Weke, Moana, Kumu	151	92	169	100
Jack crevalle	Ulua	170	54	215	63
Mackerel	Opelu	288	98	274	88
Sea bass	Hapuupuu	66	20	40	12
Snapper:					
Gray	Uku	82	28	66	24
Pink	Opakapaka, kalekale	215	94	175	71
Red	Ulaulu Koae & Ulaula	104	75	105	72
Swordfishes & Spearfishes	A'u	787	185	1,063	183
Tuna & Tunalike Fish:					
Albacore & Bluefin	Ahipalaha	21	4	29	5
Big-eyed		2,154	687	2,759	672
Yellowfin	Ahi	446	140	526	137
Skipjack	Aku	9,695	1,115	14,021	1,761
Bonito	Kanakawa	40	7	23	4
Miscellaneous		480	203	432	166
Total Ocean Catch		15,351	3,097	20,525	3,653
Pond Catch:					
Clam	Olepe	7	1	13	3
Crabs		5	2	4	2
Milkfish	Awa	16	8	16	7
Mullet	Amaama	52	43	41	37
Tenpounder	Awaawa	5	2	2	1
Miscellaneous		22	12	10	5
Total Pond Catch		107	68	86	55
Grand Total		15,458	3,165	20,611	3,708

1/ Revised. Note: Also see Commercial Fisheries Review, May 1955, p. 30.

The 1955 commercial catch of ocean fish from the island of Oahu made up 71.7 percent of the total. Of the six island areas that reported a commercial fish catch, 71.4 percent was made during the April-September period. The best single month's catch was made in June when 17.3 percent of the ocean catch was landed.

Marketing Prospects for Edible Fishery Products, Winter 1956/57

United States civilian consumption of fishery products during the six months of September 1956-March 1957 is expected to be slightly larger than a year earlier. The increase will likely be both in the canned and the frozen commodities. Retail prices of fishery products in the coming months are expected to remain above a year earlier.

Supplies of fresh and frozen fishery products through next winter may total close to those of a year earlier. Commercial landings, now on the seasonal downturn, are not expected to differ substantially from those of last fall but moderately heavier imports of frozen products are likely. Stocks of edible frozen products in cold storage on October 31 were larger than those on the same date last year. Storage holdings are the most important source for frozen fishery commodities consumed during the winter months when commercial landings are seasonally lowest.

More canned fishery products will be available during the current marketing year--which ends about mid-1957--than in the preceding year. The 1956 pack of salmon was a little larger than the very small output in 1955, but the packs of Maine sardines, tuna, and mackerel will be up considerably. The current year's pack of California sardines (pilchards) is now under way, and it is still too early to forecast the output. Domestic production of canned fishery products during the current marketing year will be supplemented to some extent by imports. Canned salmon imports probably will again be heavy since the pack increase in the United States and Alaska is not sufficient to meet expected consumer demand.

Total imports of the major fishery products in the next few months are expected to continue at a higher rate than a year earlier. The larger part of the increase probably will be for the frozen items; imports of the canned products will likely be up only slightly. Exports during the next few months may be no larger than a year ago because of the limited supplies of the canned fishery products which are polular in our foreign markets.

This analysis appeared in a report prepared by the Agricultural Marketing Service, U. S. Department of Agriculture, in cooperation with the U. S. Fish and Wildlife Service, and published in the former agency's November 2, 1956, release of The National Food Situation (NFS-78).

Maine Sardines

CANNED SARDINE STOCKS, NOVEMBER 1, 1956: Distributors' stocks of Maine sardines totaled 388,000 actual cases as of November 1, 1956, an increase of 34,000 cases or 9.6 percent over the 354,000 cases held by distributors on November 1 a year earlier. Stocks of Maine sardines held by distributors on July 1, 1956, amounted to 154,000 cases according to estimates made by the U. S. Bureau of the Census.

Fig. 1 - Canned Maine Sardines--Wholesale Distributors & Canners Stocks, November 1, 1956, with Comparisons

Type	Unit	1956/57 Season	1955/56 Season				
		11/1/56	7/1/56	6/1/56	4/1/56	1/1/56	11/1/55
Distributors' Stocks	1,000 Actual Cases	388	154	160	268	326	354
Canners' Stocks	1,000 Actual Cases 1/	1,016	315	64	152	475	625

1/100 $3\frac{1}{4}$-oz. cans equal one standard case.

Canners' stocks on November 1, 1956, as reported by the Maine Sardine Industry were 1,016,000 cases (100-$3\frac{1}{4}$-oz. cans) on November 1, 1956, as compared with 625,000 cases on the same date in 1955. Stocks held by the canners on July 1, 1956, totaled 315,000 cases.

The pack of Maine sardines from the beginning of the season on April 15 to November 1, 1956, totaled 2,101,000 cases, 80 percent or 934,000 cases above the pack on the same date in 1955. The pack of Maine sardines in 1954 amounted to 2,934,000 standard cases (100 $3\frac{1}{4}$-oz. cans).

* * * * *

<u>CANNING SEASON ENDED DECEMBER 1 WITH FAIR PACK</u>: The 1956 Maine sardine season closed on December 1, 1956, with a pack of about 2,200,000 cases (100 $3\frac{1}{4}$-oz. cans), states the Maine Sardine Council in a December 1 news release.

The Executive Secretary of the Council said that the pack was well ahead of the abnormally short pack of about 1,268,843 cases in 1955, but still far below the 2,690,000-case (10-year) average.

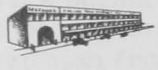
Thirty-eight plants from Portland to Robbinston, Maine, were in operation during the seven-months season, but the fish ran consistently only in waters west of Rockland, or the southern half of the State. This area supplied most of the sardines for Washington County at the eastern end of the State, which has a heavy concentration of plants.

The Washington County canners were plagued with a scarcity of fish in their area for the fifth year in a row and are patiently awaiting a report from biologists who are endeavoring to find the reason and the cure.

The Secretary said that rising costs and the fluctuating fish supply clouded the profit picture for canners despite the fairly large pack. Sales were normal throughout the season and he predicted a sellout of the pack before the plants started operating again in 1957 (season April 15-December 1).

Due to the short 1955 pack, the sardine industry went into the new season with one of the smallest carry-overs in history and the total supply is predicted to be inadequate to fill the normal demand.

He stated that the canned pack was of excellent quality and that the canners had been given much assistance along these lines through an industrywide research and grading program which was launched three years ago.

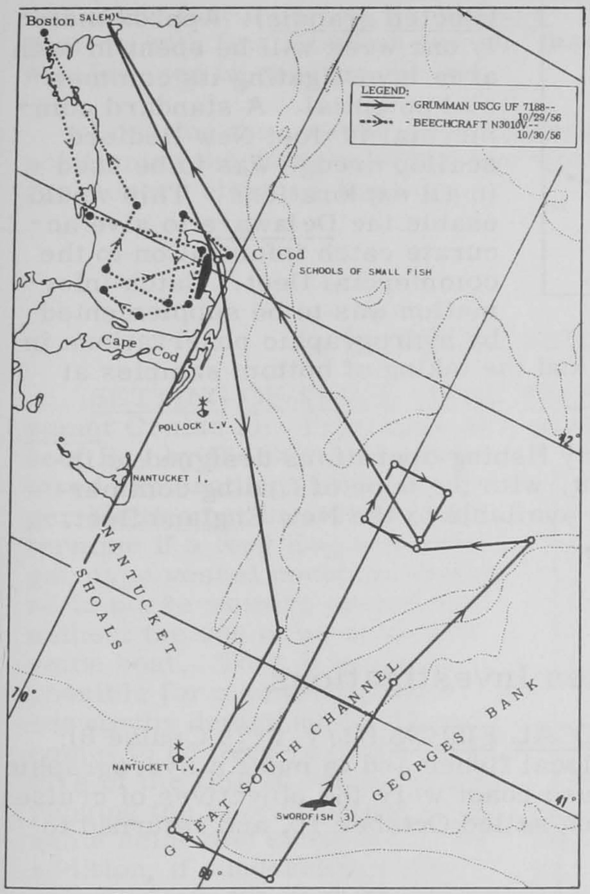


North Atlantic Fisheries Exploration and Gear Research

<u>BLUEFIN TUNA COMMERCIAL DISTRIBUTION IN NORTHWEST ATLANTIC SURVEYED BY M/V "DELAWARE"</u> (Cruise 27): Over 1,600 miles of the offshore Northwest Atlantic area was scouted by the Service's exploratory fishing vessel <u>Delaware</u> for possible commercial concentrations of bluefin tuna (<u>Thunnus thynnus</u>) during cruise 27, completed on November 2, 1956. Results from the exploratory work indicated sizable surface schools were present in the South Channel area, but the area far offshore and south to the vicinity of the Gulf Stream track produced no positive indications of surface-schooling tuna.

Several surface schools of varying size were spotted in the general area of the South Channel. The school sizes ranged from scattered breaks to one area of 200 yards in diameter. Surface temperatures in the area of the bluefin schools ranged from 57° to 67° F. Troll lines were used continuously while running during daylight hours with only two strikes during the trip, one a 32-pound bluefin taken in the South Channel area and one small dolphin (<u>Coryphaena hippurus</u>) taken while trolling near the Gulf Stream. Seventeen dolphin were caught on hand lines during the trip.

Ten small schools and one medium-size school (estimate 15 tons) were sighted by the Delaware soon after departure from Boston on October 16, 1956.



Aerial fish spotting flights (56-1 & 2) October 29 & 30, 1956.

The Delaware proceeded in rough weather to the northeast edge of Georges Bank where squid were trawled for bait. Taking advantage of good weather, the Delaware scouted south into the warmer Gulf Stream track where water temperatures ranged from 74° to 75° F. Several dolphin were taken on hand lines in the Gulf Stream area, but no surface tuna or bird flocks were sighted. After scouting along the northwest side of the Gulf Stream, the Delaware returned toward the coast. Rough weather making scouting for school tuna virtually impossible was encountered both before and after leaving the port of New Bedford.

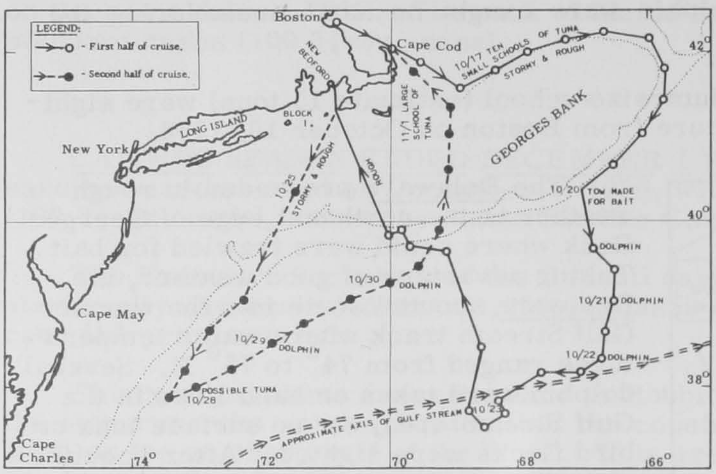
After proceeding SW. from New Bedford, two possible tuna schools were sighted in the area 38°18' N. latitude, 69°30' W. longitude. Several dolphin were again taken by hand line in the warmer water, the largest weighed 26½ pounds.

Upon returning to the South Channel area on November 1, 1956, 3 large schools of bluefin were sighted and chumming with squid was attempted, without results; however, trolling in the area for some period of time produced one 32-pound bluefin.

Flight Report 56-1 & 2: Aerial fish spotting in conjunction with the Delaware's cruise 27 was conducted on October 29, 1956, when an opportunity to accompany a U. S. Coast Guard overwater training flight gave an excellent chance to survey the South Channel area (flight 56-1). Although conditions were ideal for fish spotting, no surface schooling tuna were spotted. Three swordfish were seen in the east side of the South Channel and several (12+) large schools of small fish near shore in Cape Cod Bay extending south from off Provincetown. Also, one school was sighted in shallow water near Race Point. Cape Cod Bay was not searched on the 29th for tuna, as the major objective of the survey was the offshore area.

During the evening of the 29th, over 37,000 pounds of bluefin were taken in the Provincetown traps and as a result a flight to survey the Cape Cod area was made on October 30, 1956 (flight 56-2). The extensive schools of small fish (unidentified as to species) were still present in the inshore area with the center of distribution about three miles S. of Provincetown. A small school of bluefin (15-20 in number) was spotted in the bay about 5 miles S. of Provincetown indicating that tuna were still present in the inshore areas.

The Delaware was scheduled to depart from East Boston, November 14, 1956, to conduct exploratory scallop dragging in offshore areas where the commercial fleet does not normally operate.



M/V Delaware Cruise 27 (October 16-November 2, 1956).

The two-week scallop exploratory trip was to systematically survey portions of Brown's Bank and areas within the Gulf of Maine for commercial concentrations of ocean scallops (*Pecten grandis*). Approximately one week will be spent in each area investigating its commercial potential. A standard commercial 11-foot New Bedford scallop dredge was to be used in all explorations. This would enable the *Delaware* to give accurate catch information to the commercial fleet. Catch information was to be supplemented by hydrographic observations in the form of bottom temperature recordings, and the taking of bottom samples at specified intervals.

This is the first in a series of exploratory fishing operations designed to investigate the many areas not fished at present, with the hope of finding commercially-profitable scallop beds which would be available to the New England fleet.

North Atlantic Fisheries Investigations

STUDIES INTO FEEDING HABITS OF LOCAL FISHES (M/V *T-79* Cruise 8): To conduct studies into the feeding habits of local fishes and to make a hydrographic transect of the "Deep Hole" off the New England coast were the objectives of cruise 8 of the Service's research vessel *T-79*, which sailed October 10, and returned to Woods Hole, Mass., October 12, 1956.

The hydrographic transect of "Deep Hole" was accomplished without difficulty. Samples of water were saved for salinity, phosphate, and nitrate analysis. On September 12 (*T-79* Cruise 6), a moderately-developed thermocline existed throughout the area with a temperature spread from top to bottom of more than 15° F. On October 13 the surface had cooled over 6° F. and the thermocline was gone, the spread of temperature being less than 7° F. in the deepest part. The picture presented by the distribution of nutrients and O_2 showed that the "Deep Hole" was in a state of flux. A wedge of water moving into the "Deep Hole" from the onshore side was replacing the colder and nutrient deficient water. Within this wedge, local fishermen were catching relatively large numbers of blackback flounders in addition to the other species commonly found there.

Where the bottom water had not yet been replaced, no blackbacks were caught. On September 12 when conditions were relatively stable, the common flatfish on the edge of the "Deep Hole" was the yellowtail flounder. No yellowtails were caught during this cruise.

* * * * *

UNDERWATER TELEVISION OBSERVATION OF FISH CAPTURED BY OTTER TRAWL: In order to observe the behavior of fish while being captured by an otter trawl, the Service's North Atlantic Fisheries Investigations chartered the M/V *Huckleberry Finn* for some underwater observations with a television camera. The

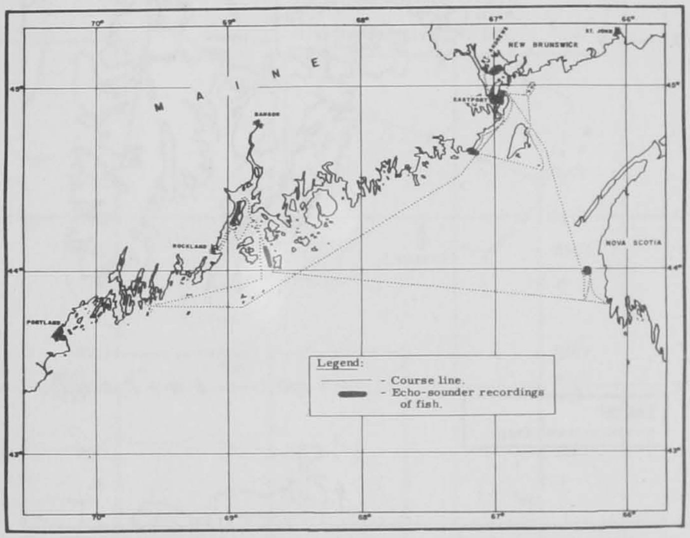
Huckleberry Finn was joined on the Amagansett grounds off Long Island, N. Y., by the William Chesebrough, a Pt. Judith trawler trawler. The cruise operations were conducted October 29-November 1, 1956.

The otter trawl was located by a recording echo-sounder approximately 450 feet behind the trawler William Chesebrough, in 50 to 80 feet of water. A tow line was made fast from the Huckleberry Finn to maintain this distance. The television camera with fins attached and an "Issacs" depressor at the end of the support chain was lowered to observe the net.

Locating the net was difficult because of turbidity and the variables involved in positioning the camera with a two-boat operation. Some views of netting at close range were obtained however.

North Atlantic Herring Research

SETTING OF PURSE SEINE FROM DECK OF DRAGGER TESTED (M/V Metacomet Cruise 9): Trial sets of a purse seine were made in Linekin Bay and Penobscot Bay by the Service's chartered exploratory fishing dragger Metacomet in order to determine if a New England dragger-type vessel could be adapted to purse-seining operations without the use of an auxiliary seine boat. Then it would be possible for a vessel of such seaworthy design as the Metacomet to be used in offshore waters of the Gulf of Maine without running the risk of losing a valuable seine and seine boat. In addition, if successful, purse-seining from the deck of a vessel (particularly if the power block was used) would enable the vessel to operate with about half the crew needed to set and purse the seine by the traditional methods used in the Gulf of Maine. In New England, purse seiners using the combination mothership and seine boat are limited to fishing during good weather. The second objective of this ninth and final cruise (October 18-27, 1956) of the Metacomet was to locate herring by echo-sounder and visual observation.

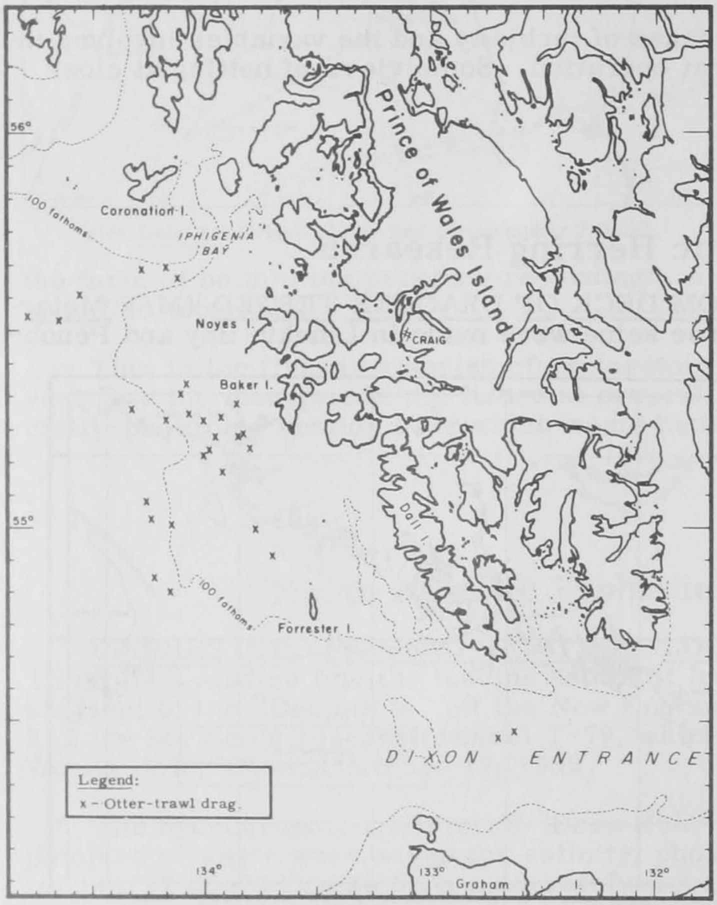


U. S. Fish and Wildlife Service cruise 9 of charted M/V Metacomet.

The waters indicated on the chart were sounded. Fish were located in Passamaquoddy Bay, Grand Manan Channel near Cutler, Trinity Ledge on the Coast of Nova Scotia, Isle Au Haut Bay, and West Penobscot Bay. Echo-sounder recordings and sampling with a small midwater trawl indicated that the fish located in these areas were small herring between 3 and 5 inches in length. The seine was not set on these soundings since the fish were too small and often too deep to be caught.

In each of the trial sets of the seine made in Linekin Bay and Penobscot Bay, the seine was set smoothly over the starboard gunwale from the well deck of the vessel. Purse lines were pulled through blocks on a seine davit to winch heads on the trawl winch and the seine was hauled aboard with a "Puretic" power block. Although some difficulty was experienced with the seine becoming fouled in the purse line, these trials demonstrated that a purse seine can be set and hauled using this type of vessel, properly equipped. The problems of purse-line fouling might be overcome by small changes in the method of setting and pursing the net or by slight modification of the seine hanging.

North Pacific Exploratory Fishery Program

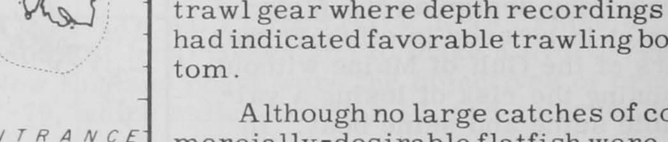


M/V John N. Cobb Cruise 29 (Oct. 1-Nov. 16, 1956).

BOTTOM FISH GROUNDS OFF SOUTHEASTERN ALASKA SURVEYED BY M/V "John N. Cobb" (Cruise 29): Several species of commercially-desirable bottom fish were caught off the west coast of Prince of Wales Island, Alaska, during a cruise from October 1 to November 16, 1956, by the Service's exploratory fishing vessel John N. Cobb.

A series of 30 otter-trawl drags were made at depths of 57 to 208 fathoms between Dixon Entrance and Iphigenia Bay. Although good trawling bottom was located in some areas, extensive soundings made with a recording depth-sounder also revealed large areas of unsuitable trawling bottom. In some cases, bottom obstructions were encountered by the trawl gear where depth recordings had indicated favorable trawling bottom.

Although no large catches of commercially-desirable flatfish were made, several drags off Baker Island at depths of 57 to 95 fathoms caught dover sole, petrale sole, rex sole, and rock sole in amounts up to 200, 150, 250, and 175 pounds, respectively, an hour. Trash fish, mostly turbot, pollock, and ratfish, were taken in this area in amounts from 150 to 2,400 pounds per hour. The dragging bottom off Baker Island was generally good at depths of 55 to 95 fathoms. Soundings made in the "trough" between Dall and Forrester Islands revealed no suitable dragging bottom. No clear dragging bottom was located along the 115-fathom "edge" between Forrester Island and Baker Island.



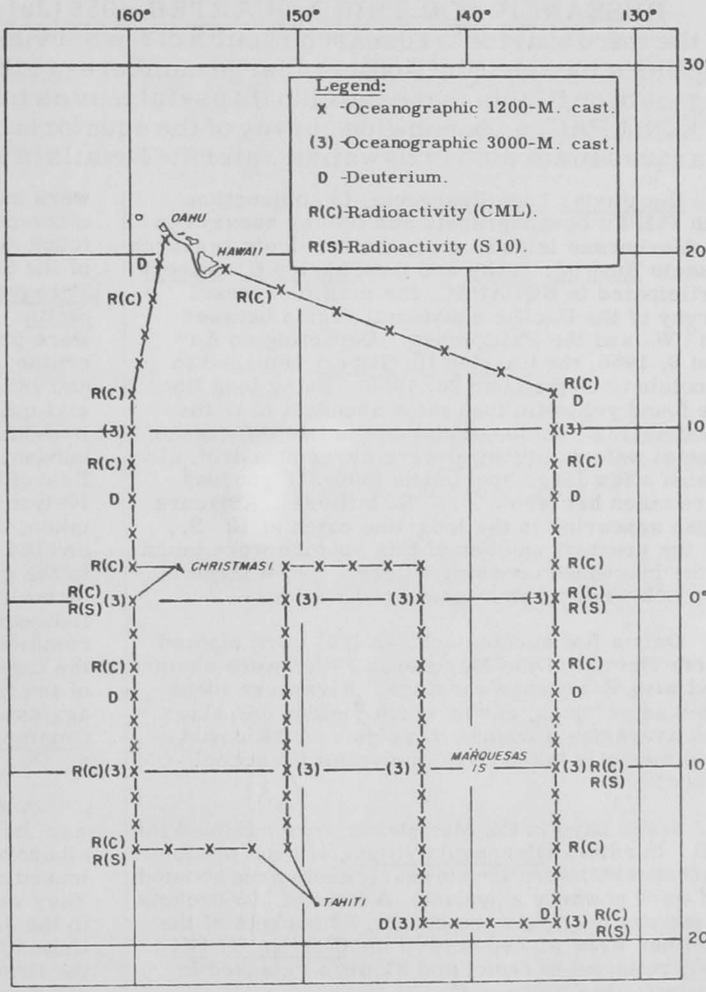
A good catch of bottom fish being sorted aboard the M/V John N. Cobb.

Favorable catches of rockfish were made at depths of 112 to 139 fathoms off Iphigenia Bay, with the best drag yielding a total of 2,100 pounds of rockfish, including 1,200 pounds of black rockfish, 800 pounds of Pacific ocean perch, and 100 pounds of red rockfish in one hour. Turbot and pollock dominated the catches at these depths. The dragging bottom was exceptionally good in this area.

Stormy weather seriously curtailed exploratory fishing activities throughout the entire period of the survey, resulting in inconclusive findings regarding the extent of the available grounds suitable for otter trawling and the abundance of commercially-desirable species of fish present.

Pacific Oceanic Fishery Investigations

OCEANOGRAPHY OF PACIFIC EQUATORIAL REGION SURVEYED (Hugh M. Smith, Cruise 35): During a cruise that lasted from August 1 to October 5, the Service's research vessel Hugh M. Smith occupied 79 oceanographic stations as part of an international survey (EQUAPAC) of the Pacific equatorial region between 135° W. longitude and the Philippine Islands. The area surveyed included a study of the circulation features and areas of potential productivity in the region of the Marquesas and Tuamotu Islands. A total of 79 oceanographic stations, bathythermograph lowerings, zooplankton tows, and pelagic trawl hauls were the principal operations during the cruise. Field examination of the plankton volumes showed that in general the quantities collected during night-time tows were 1 to $1\frac{1}{2}$ times those taken during daylight hours and that the volume of plankton decreased rapidly south of the equator.



M/V Hugh M. Smith Cruise 35 (August 1-October 5, 1956)--shows oceanographic stations completed for EQUAPAC.

A watch was maintained during daylight hours for tuna schools and bird flocks while the vessel was under way. A total of 85 bird flocks and 60 tuna schools were sighted; 39 of the tuna schools were unidentified, 13 were identified as skipjack, and 8 as yellowfin. Of the 85 bird flocks sighted, only 28 were seen during passage south of the equator between 135° W. and the island of Tahiti, 43 were sighted between Tahiti and Honolulu. Of the 60 tuna schools, 36 were sighted between Tahiti and Honolulu, of which 24 were located between 4° S. and Christmas Island on 160° W.

A 45-station pattern, a continuation of the 18-month monitoring survey in the area of the Hawaiian skipjack fishery, was completed around the island of Oahu prior to proceeding south for EUQAPAC.

* * * * *

SKIPJACK TUNA TAGGED WITH HARPOON-TYPE TAG RECOVERED: Considerable interest was engendered by the return of a skipjack tuna that had been tagged with the new harpoon-type tuna tag developed by the Pacific Oceanic Fishery Investigations. This tag is of all-plastic construction and so far has been placed on small lots of skipjack only. The single return, at liberty for 3 months, was surprising in view of the fact that only 45 specimens had been released with the new tag. The tag wound had healed nicely, and an autopsy of the specimen indicated that the fish was not at all handicapped by the new tag. It is too early to state just how successful the tag will ultimately be, but it is now known that it can be placed on tuna in approximately $\frac{1}{4}$ the time that it takes to tag fish with the conventional "spaghetti" tag. This means that several times as many fish can be tagged with a given crew of men and that returns should be better, simply because the tuna are out of the water for only a few seconds during the tagging.

* * * * *

RESEARCH FOR THIRD QUARTER 1956 (July 1-September 30, 1956): Highlights of the third quarter's research results of the Service's Pacific Oceanic Fishery Investigations included the finding of large numbers of albacore tuna north of Hawaii; completing tests on tilapia that establish its usefulness as tuna bait; completion of the field work of EQUAPAC, an oceanwide survey of the equatorial Pacific; and a second stocking of the Marquesan sardine in Hawaiian waters. Details of some of the research results follow:

Equatorial Tuna Research: In conjunction with POFI's oceanographic and fishing surveys in the Marquesas Islands area, the Service's research vessels *Hugh M. Smith* and the *Charles H. Gilbert* participated in EQUAPAC, the multiple-vessel survey of the Pacific equatorial region between 135° W. and the Philippines. Departing on August 6, 1956, the *Charles H. Gilbert* returned to Honolulu on September 26, 1956. Using long line, she found yellowfin tuna most abundant near the equator (132° W. longitude) and in the Marquesan coastal waters; big-eyed were never abundant, although a few large specimens (300-370 pounds) were taken between 5°-11° S. latitude. Albacore began appearing in the long-line catch at 12° S., but the greatest number of this species were taken in the Marquesan coastal waters. A few large skipjack were taken at scattered stations.

Only a few surface schools (16) were sighted in the vicinity of the Marquesas. Ten were chummed with Marquesan sardines. Five were identified as skipjack, one of which yielded 344 skipjack averaging 5 pounds in weight. A 16-pound specimen was taken from one yellowfin school fished.

Seven bays in the Marquesas were sampled for bait. Sardines (*Harengula vittata* was the predominant species) were seen in nearly every area scouted but were nowhere abundant. A total of 305 buckets of various species were caught; 62 buckets of the sardines were placed aboard the *Charles H. Gilbert*, returned to Oahu, and 21 were released in Hanauma Bay, Oahu.

Another tagged yellowfin was recovered during the quarter in the Line Islands area. This marks the second recovery from a total of over 1,000 tagged in this area. Tagged near Christmas Island on October 8, 1955, the yellowfin was recaptured in the same vicinity on August 2, 1956, thus was at liberty for 299 days.

Albacore Research: The most significant development during the quarter was the success of the exploratory fishing cruise of the *John R. Manning* (cruise 32) made from July 16 to September 12 to the waters north of the Hawaiian Islands. The purpose of the cruise was to determine if there were sufficient quantities of albacore to support a commercial fishery in the area where they were found during the summer of 1955 by the vessels of the Service's Pacific Salmon Investigations, *Paragon* and *Mitkof*, and the POFI vessel *Hugh M. Smith*. The results of the cruise showed that they were present in parts of the area covered by the cruise, roughly 40° N. to 49° N. between 175° W. and 145° W., in amounts approaching commercial quantities. The pattern and magnitude of the individual catches showed that they were most abundant west of 160° W. between 43° N. and 47° N. East of 160° W. the catches decreased progressively to the eastward. A total of 604 albacore were taken; 453 in the gill nets, 47 in the trammel nets, and 104 on the trolling lines. The best day's catch in the gill and trammel nets was 89 and the best by trolling was 35. Eighty-six of the troll-caught fish were tagged and released. Almost all of the remaining fish (6,597 pounds) were delivered to the cannery. Only 102 pounds or about 2 percent of the fish were rejected, making the total penalty against catch 306 pounds or 4.6 percent. (See *Commercial Fisheries Review*, November 1956, p. 48).

Another item of interest during the quarter was the report of the capture of two more tagged albacore. They were both fish that had been released about a week apart during the fall of 1955. They were recaptured about 6 weeks apart, one in the Japanese spring fishery and one in the United States west coast fishery. The latter gives the first positive evidence of easterly migration of albacore from mid-ocean.

Tuna Bait Studies with Tilapia: In the spring of 1956, the Hawaiian Tuna Packers, Ltd. and the Pacific Oceanic Fishery Investigations joined forces in an informal agreement for the purpose of seining supplies of small bait-size Tilapia and testing these fish at sea to determine their qualities as skipjack bait. Seven full days and 2 half days of seining yielded approximately 600 pounds of small tilapia. These were obtained from freshwater ponds and therefore had to be acclimatized to sea water before the sea tests.

The effective use of tilapia as skipjack tuna bait was examined on 14 vessel days at sea in waters off Oahu. It was the prime objective of these tests to compare the ability of nehu (the standard bait) and tilapia in attracting and holding schools of skipjack at the stern of the vessel. A summary of the results shows that 21 (56 percent) of the 37 schools chummed with nehu surfaced and responded to the bait, whereas 10 (62 percent) of the 16 schools chummed with tilapia gave a favorable response to the bait.

Skipjack were caught from 9 schools at the rate of 3.5 fish per bucket of tilapia used. This is not as good as the catch rate of 8.2 skipjack per minute and 15.2 per bucket of bait obtained with nehu, but there is every reason to believe that with experience chummers will learn to use the new bait more effectively.

It is our conclusion that tilapia is an adequate bait for catching skipjack. In some respects it may be slightly inferior to nehu, but it has several compensating qualities. It is an exceedingly hardy fish and can survive in bait tanks for much longer periods than the nehu. The larger tilapia tend to sound when thrown out as chum, but this trait is not prevalent in fish $1\frac{1}{2}$ to 2 inches in length, which is the optimum size for skipjack bait. Our studies indicate that if economically feasible rearing methods can be developed, the tilapia can alleviate the great need in the Hawaiian skipjack fishery for additional bait supplies.

"Greening" in Yellowfin: In investigating the chemistry of "off-color" or "greening" in yellowfin tuna, additional studies have been conducted on the reflectal spectrophotometric characteristics of raw and cooked, normal and green meat. These have led to the conclusion that the pigment involved is a heme protein, probably myoglobin. Raw meat which will turn green on cooking seems to have unusual quantities of the ferric oxidized form, metmyoglobin. On cooking, denaturation of the globin produces relatively more of the reduced form, hemochrome, than the nonreduced form, hemichrome, in green as compared with normal tuna meat. It is the relative quantities of these two denatured globins, with different spectral reflectances which determine whether the meat will appear green or normal. Some evidence also exists for a low concentration of additional pigments in cooked green meat, which may be unusual hemi- or myoglobin derivatives. Both browning and greening seem to be manifestations of oxidation of the heme protein pigments.

Salmon

1956 PACK 25 PERCENT HIGHER THAN IN 1955: Red salmon, coming back to their spawning grounds in numbers reminiscent of other days, spearheaded the 1956 Alaska salmon pack to an increase of more than 25 percent over that of 1955.

Table 1 - Alaska's Canned Salmon Pack by Species and Area, 1955-56

Species	1/ 1956				1955			
	South-eastern	Central	Western	Total	South-eastern	Central	Western	Total
	(Standard Cases of 48 1-Lb. Cans)							
King	1,272	21,212	23,767	46,251	1,157	22,078	24,583	47,818
Red	72,851	341,030	579,761	993,642	55,561	233,290	332,793	621,644
Pink	634,272	516,140	3,918	1,154,330	540,495	696,880	90	1,237,465
Chum	294,282	365,088	32,197	691,567	177,667	162,999	22,968	363,634
Silver or Coho	46,497	49,015	4,388	99,900	64,814	47,294	2,476	114,584
Total	1,049,174	1,292,485	644,031	2,985,690	839,694	1,162,541	382,910	2,385,145

1/ Preliminary data.

Preliminary figures indicate a 1956 pack of 2,986,030 standard cases (48 1-lb. cans), or 600,000 cases above the 1955 total, and not far behind the 3,094,452 cases of 1954. While the pack is still below the long-term average, the trend which has been generally down since 1943 appears to have been arrested by the conservation measures which are now in effect.

Pink salmon still have "to turn the corner," but U. S. Fish and Wildlife Service officials report that current conservation practices, especially in Prince William Sound and southeastern Alaska, demonstrated their effectiveness in 1956.

One very encouraging aspect of the 1956 run is that escapement of both red and pink salmon to the spawning grounds in most areas was well above the average of recent years, a fact which portends well for the fisheries of future years. The total red salmon run in the Naknek-Kvichak section of Bristol Bay was approximately 15 million fish, of which 11 million avoided the nets and kept on toward the spawning grounds. Heavy escapements of red salmon are reported in the Nelson Lagoon and Sandy Lake and other places along the Peninsula. Chignik experienced a good escapement of red salmon and in Cook Inlet the escapement is reported to have exceeded anything achieved in recent years; that of Prince William Sound pink salmon was reported excellent, while escapement of that species in southeastern Alaska is listed as good to excellent.

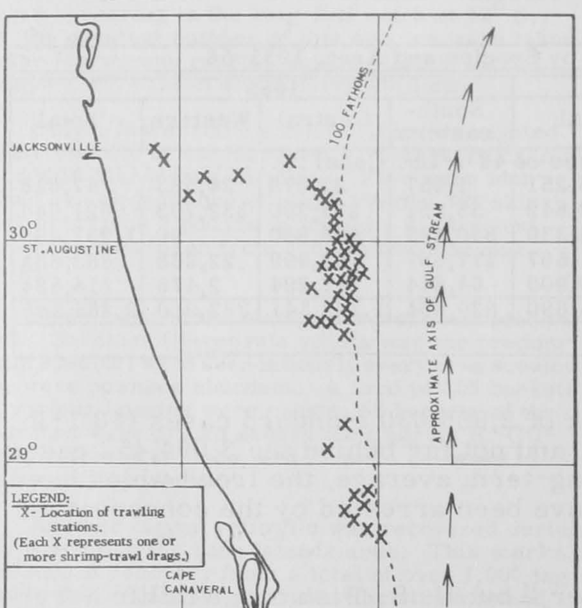
Since the life cycle of the salmon varies from two years with the pinks to four to six years with the reds, results of the 1956 escapements will be reflected in the runs of 1958 and later years.

Little is known of that part of the salmon's life spent at sea but biological studies are being made on this phase of its life history at the present time. The pink salmon caught this year were smaller than average, going 22 to 25 to the case instead of the usual 17 or 18.

Conservation measures being practiced at the present time include provisions for adequate escapement, better protection of the spawning beds, reduction of predators, stream clearance, etc. Biological research includes: numerous studies on depredation and other natural factors which affect the salmon from the time the mature fish reach the spawning beds until the young ones begin their life in the ocean. In addition, there are now oceanographic and biological studies to determine what conditions effect salmon at sea.

South Atlantic Exploratory Fishery Program

FLORIDA EAST COAST SURVEY FOR ROYAL-RED SHRIMP CONTINUED (M/V Combat Cruise 5): Additional production-type dragging for royal-red shrimp was carried out by the U. S. Fish and Wildlife Service-chartered shrimp trawler M/V Combat in 160-200 fathoms off St. Augustine, Fla., during August and September 1956. Nineteen drags made with 40-foot and 56-foot flat trawls during August 17-22 yielded a total of 3,305 pounds of heads-on royal-red shrimp (25-count headed). Individual catches ranged from 60-360 pounds and averaged approximately 170 pounds of shrimp a 3- to 5-hour drag. Lower catch rates were obtained in the same area between September 14-19 when 20 drags caught a total of 2,321 pounds of heads-on royal-red shrimp, averaging 115 pounds a drag. During the latter trip, seven drags were made south of the St. Augustine grounds in depths of 150 to 225 fathoms. Catches ranged from 40 to 80 pounds of royal-red shrimp a drag, with equal amounts of 21-25 count and 61-70 count heads-off shrimp in each successful drag.



M/V Combat September 1956 trip.

A commercial shrimp vessel, the M/V Northeaster, working with the Service-chartered M/V Combat during the mid-September trip, landed approximately 1,800 pounds of headed royal-red shrimp.

The August 30-September 4 period was devoted to additional shallow-water exploration along the Florida coast north of Cape Canaveral. A total of 26 drags were made in depths of 13-18 fathoms and 5 in 100-150 fathoms, using 40-foot flat trawls and a 10-foot beam trawl. Although several isolated trawling areas were located, the bottom was found to be mostly coral and generally untrawlable out to the edge of the continental shelf. Drags in 22 to 23 fathoms using a 40-foot trawl caught large rock shrimp (Sicyonia brevirostris), at rates of 90 to 150 pounds an hour during night fishing.

While fishing at night during this period, several large schools of sardines (Sardinella anchovia) were observed and picked up on the depth recorders between the 10- and 40-fathom curves. Samples were obtained using a dip net.

U. S. Fish Catch May Set All-Time Record in 1956

United States fishermen in Alaska may catch more than 5 billion pounds of fish in 1956 and set an all-time national record unless some unforeseen circumstance intervenes, Secretary of the Interior Fred A. Seaton announced on November 5, 1956.

U. S. Fish and Wildlife Service records indicate that about 70 percent of a year's catch is landed by September 1 and that this year the total landings are running nearly half a billion pounds ahead of those of last year and well ahead of the catch on September 1, 1941--the record year. Even if the catch in the final quarter is only normal the record will be broken, the Secretary explained.

In 1955 the total American catch was 4.9 billion pounds, which is the present record year.

Menhaden, a fish used primarily for oil and meal and usually comprising about 40 percent of the catch, is setting the pace with an increase of 200 million pounds. Other species which have been taken in considerably greater quantity than in 1955 are: tuna, up 60 million pounds; Alaska salmon, up 50 million; Alaska herring, up 39 million; California sardine, up 28 million; Maine sardine, up 26 million; Pacific jack mackerel, up 23 million; Pacific mackerel, up 9 million; ocean perch, up 6 million; haddock, up 10 million; halibut, up 7 million.

The ex-vessel value for the 1955 catch was $325 million. Prices are somewhat better this year, which together with the larger catch indicates an increase in the ex-vessel value of the catch.

United States Fishing Fleet[1/] Additions

OCTOBER 1956: A total of 49 fishing vessels of 5 net tons and over were issued first documents as fishing craft during October 1956, according to the U. S. Fish and Wildlife Service. This was 8 vessels more than the number reported for the same month last year.

Table 1 - Vessels Issued First Documents as Fishing Craft, by Tonnage, October 1956

Net Tons	Number
5 to 9	29
10 to 19	9
20 to 29	3
30 to 39	8
Total	49

A total of 454 fishing vessels was documented for the first time during the first

1/Includes both commercial fishing and sport fishing craft.

ten months of 1956--an increase of 77 craft (20 percent) more than the number reported for the corresponding period of last year. During the ten-month period of 1956, the Chesapeake led all other areas with 109 newly-documented vessels, followed by the South Atlantic area with 109.

Table 2 - U. S. Vessels Issued First Documents as Fishing Craft, by Areas, October 1956 and Comparisons

Area	October		Jan.-Oct.		Total
	1956	1955	1956	1955	1955
	........(Number).........				
New England	1	1	14	17	18
Middle Atlantic	2	1	23	12	13
Chesapeake	22	10	109	44	54
South Atlantic	14	11	106	61	65
Gulf	6	15	89	92	103
Pacific	3	3	71	110	117
Great Lakes	-	-	2	7	9
Alaska	1	-	40	31	35
Hawaii	-	-	-	3	3
Virgin Islands	-	-	-	-	1
Total	49	41	454	377	418

Note: Vessels assigned to the various sections on the basis of their home port.

U. S. Foreign Trade

EDIBLE FISHERY PRODUCTS, AUGUST 1956: Imports of edible fresh, frozen, and processed fish and shellfish in August increased 5 percent in quantity and

Table 1 - United States Foreign Trade in Edible Fishery Products, August 1956 With Comparisons

Item	Quantity			Value		
	Aug.		Year	Aug.		Year
	1956	1955	1955	1956	1955	1955
Imports:	(Millions of Lbs.)			(Millions of $)		
Fish & Shellfish:						
Fresh, frozen, & processed 1/	74.6	71.1	769.9	22.3	18.6	206.4
Exports:						
Fish & Shellfish:						
Processed 1/ only (excluding fresh and frozen)	4.8	5.8	91.0	1.1	1.6	21.6

1/ Includes pastes, sauces, clam chowder and juice, and other specialties.

1.8 percent in value as compared with July 1956. Compared with August 1955 the imports for August 1956 were higher by 5 percent in quantity and 20.0 percent in value. August 1956 imports averaged 29.9 cents a pound as compared with 26.2 cents a pound for the same month in 1955 because of the higher prices prevailing for many imported fishery products, particularly shrimp and spiny lobster tails.

Exports of edible processed fish and shellfish in August decreased 19 percent in quantity and 15 percent in value as compared with August 1956. Compared with August 1955 the imports for August 1956 were also lower by 17 percent in quantity and 31 percent in value.

* * * * *

GROUNDFISH FILLETS IMPORTS REACH RECORD HIGH IN OCTOBER 1956: A total of 25.7 million pounds of cod, haddock, hake, pollock, and ocean perch fillets, including fish blocks, were imported into the United States during October 1956--the highest ever recorded for any one month. This was an increase of 8.8 million pounds or 52 percent as compared with the same month of 1955. The increase was due primarily to increased imports from Canada (up 5.0 million pounds) and from Iceland (up 3.1 million pounds). Imports from Norway and Denmark also were somewhat larger, while receipts from the Netherlands and West Germany were less than in October 1955.

Groundfish and ocean perch fillets imported from Canada during October 1956 amounted to 17.2 million pounds--67 percent of the total; Iceland accounted for 25 percent; and the remaining 8 percent came from Norway, Denmark, the United Kingdom, the Netherlands, France, West Germany, and Greenland.

Eleven countries exported 128.7 million pounds of groundfish and ocean perch fillets (including blocks and slabs) to the United States during the first 10 months of 1956, while twelve countries exported 114.6 million pounds of these products during the corresponding period of 1955. Canada (91.4 million pounds) led all other countries in exports of these items to the United States with 71 percent of the 10-month total. Iceland (26.6 million pounds) was in second place, followed by Norway (3.9 million pounds), Denmark (2.9 million pounds), and West Germany (1.9 million pounds).

Note: See Chart 7 in this issue.

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TUNA CANNED IN BRINE IMPORTS UNDER QUOTA PROVISO: The quantity of tuna canned in brine which may be imported into the United States during April 16 through December 31, 1956, at the $12\frac{1}{2}$-percent rate of duty is limited to 28,757,393 pounds. Any imports in excess of that quantity will be dutiable at 25 percent ad valorem.

Imports under the quota from April 16-November 3, 1956, amounted to 22,489,317 pounds, according to data compiled by the Bureau of the Customs. This leaves a balance of 6,268,076 pounds of the quota which may be imported in the last two months of 1956 at the $12\frac{1}{2}$-percent rate of duty.

Wholesale Prices, October 1956

The major United States fisheries in October were entering a period of low yield--the West Coast halibut season ended; the season for canning salmon was about over; the canning season for Maine sardines continued, but at a low level; and the yield for some fresh-water fish was poor. On the other hand, the tuna catch continued at a high level; the New England haddock fishery was normal; Gulf shrimp production was good, but not up to expectations; and oyster harvesting was entering the period of peak production, but with indications of a below-average season. October 1956 wholesale prices were down slightly from September 1956, but were still higher than for the same month in 1955. The October 1956 wholesale index (112.5 percent of the 1947-49 average) for all edible fresh, frozen, and canned fish and shellfish declined about 1.6 percent from September, but was higher by 4.7 percent than for October 1955.

The leading finfish from a production standpoint in the drawn, dressed, and whole finfish subgroup were haddock and yellow pike, all the other varieties--salmon, halibut, lake trout, and whitefish--were relatively scarce in the fresh fish markets. This supply situation was reflected in the mixed trends in this subgroup with the net result that from September to October 1956 the subgroup index dropped 7.6 percent. When compared with October 1955, the October 1956 index for this subgroup was higher by 6 percent. Prices for most of the seven fish products in the drawn, dressed, and whole finfish subgroup were higher in October 1956 than in the same month in 1955.

The October 1956 index for the fresh processed fish and shellfish subgroup was only 0.7 percent lower than for the preceding month and higher by 15.2 percent than in October 1955. Higher prices in October 1956 for fresh headless shrimp at New York and fresh shucked oysters offset the lower prices for Boston haddock fillets.

Table 1 - Wholesale Average Prices and Indexes for Edible Fish and Shellfish, October 1956 With Comparisons

Group, Subgroup, and Item Specification	Point of Pricing	Unit	Avg. Prices1/ ($)		Indexes (1947-49=100)			
			Oct. 1956	Sept. 1956	Oct. 1956	Sept. 1956	Aug. 1956	Sept. 1955
ALL FISH & SHELLFISH (Fresh, Frozen, & Canned)					112.5	114.3	114.6	107.4
Fresh & Frozen Fishery Products:					122.0	125.8	126.5	110.1
Drawn, Dressed, or Whole Finfish:					122.5	132.6	131.2	115.6
Haddock, lge., offshore, drawn, fresh	Boston	lb.	.07	.10	67.4	100.1	101.3	106.3
Halibut, West., 20/80 lbs., drsd., fresh or froz.	New York	lb.	.43	.45	135.5	139.2	136.9	99.3
Salmon, king, lge. & med., drsd., fresh or froz.	New York	lb.	.67	.68	150.6	151.7	148.3	135.1
Whitefish, L. Superior, drawn, fresh	Chicago	lb.	.75	.61	185.9	151.2	121.5	161.1
Whitefish, L. Erie pound or gill net, rnd., fresh	New York	lb.	.80	.74	161.8	149.6	131.4	161.7
Lake trout, domestic, No. 1, drawn, fresh	Chicago	lb.	.75	.58	153.6	117.8	122.9	116.8
Yellow pike, L. Michigan & Huron, rnd., fresh	New York	lb.	.36	.50	83.3	117.3	129.0	75.1
Processed, Fresh (Fish & Shellfish):					125.4	126.3	122.2	108.9
Fillets, haddock, sml., skins on, 20-lb. tins	Boston	lb.	.27	.29	91.9	97.0	97.0	102.1
Shrimp, lge. (26-30 count), headless, fresh	New York	lb.	.71	.72	112.2	113.0	110.2	87.1
Oysters, shucked, standards	Norfolk	gal.	6.00	6.00	148.5	148.5	142.3	136.1
Processed, Frozen (Fish & Shellfish):					106.2	102.9	114.5	93.3
Fillets: Flounder, skinless, 1-lb. pkg.	Boston	lb.	.39	.40	102.1	103.4	103.4	102.1
Haddock, sml., skins on, 1-lb. pkg.	Boston	lb.	.28	.28	86.3	86.3	86.3	84.7
Ocean perch, skins on, 1-lb. pkg.	Boston	lb.	.27	.28	108.8	110.8	110.8	106.7
Shrimp, lge. (26-30 count), 5-lb. pkg.	Chicago	lb.	.69	.64	105.7	99.2	120.4	83.3
Canned Fishery Products:					99.0	98.0	97.7	103.4
Salmon, pink, No.1 tall (16 oz.), 48 cans/cs.	Seattle	cs.	22.65	22.65	122.0	120.0	120.0	114.8
Tuna, lt. meat, chunk, No. 1/2 tuna (6-1/2 oz.), 48 cans/cs.	Los Angeles	cs.	10.85	10.60	78.2	76.4	76.4	92.3
Sardines, Calif., tom. pack, No. 1 oval (15 oz.), 48 cans/cs.	Los Angeles	cs.	7.75	7.50	90.4	87.5	87.5	88.1
Sardines, Maine, keyless oil, No. 1/4 drawn (3-1/4 oz.), 100 cans/cs.	New York	cs.	7.70	7.70	81.9	81.9	79.8	87.3

1/Represent average prices for one day (Monday or Tuesday) during the week in which the 15th of the month occurs. These prices are published as indicators of movement and not necessarily absolute level. Daily Market News Service "Fishery Products Reports" should be referred to for actual prices.

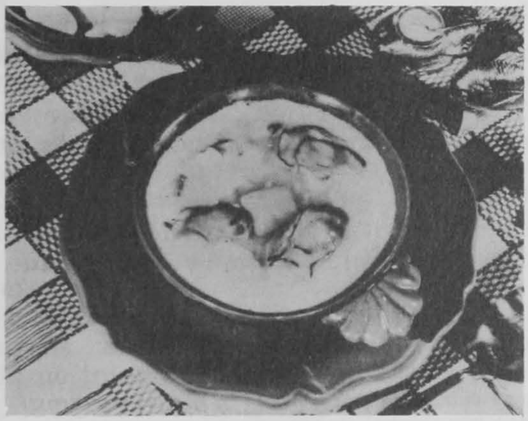
Wholesale prices for fresh shrimp at New York City were up about 9 percent from October 1955 to October 1956, but haddock fillet prices at Boston were down 10 percent over the same period.

Wholesale prices for processed frozen shrimp in October were directly opposite to the seasonal trend. As a rule frozen shrimp prices drop in the fall months, but this October they rose because of (1) below-normal landings in the Gulf, (2) relatively low stocks, and (3) the steady demand for this commodity during periods of high wage levels. Frozen fillet prices in October 1956 were down slightly from the previous month, but still were higher than for October 1955. The frozen processed fish and shellfish subgroup index for October 1956 was 3.2 percent above the previous month and 12.1 percent above the same month in 1955.

The index for the canned fish subgroup continued to show signs of firmness in October 1956 when compared with both September and August 1956. Although still below the October 1955 index by 4.3 percent, the price gap between the two years is closing. The drop in canned tuna prices was reversed with an increase in October of 25 cents a case for the chunk-style light-meat pack. Although the California sardine fishing season was off to a good start, early indications of a fair season did not continue up to the end of October and as a result canned California sardine (pilchard) prices moved upward. The marketing situation for all canned fish was very healthy at the end of October 1956.

NOW IS THE TIME FOR OYSTER STEW

Now is the time to serve a tempting bowl of steaming hot oyster stew. This dish will have special appeal to all and it is so easy to prepare.



Oysters are entirely edible and there is no waste from trimmings. And nutritionally speaking, they are wonderful! An average serving of six oysters will supply more than the daily allowance of iron and copper, about one-half the iodine, and about one-tenth of the needed protein, calcium, magnesium, phosphorus, vitamin A, thiamine, riboflavin, and niacin. To retain the delicate, distinctive flavor of oysters, never cook them too long, just enough to heat them through and leave them plump and tender.

Oyster stew served in a large bowl accompanied by crisp crackers, a jellied fruit salad, and a home baked cake will form the basis for an attractive, delectable, nutritious meal. Here is a recipe for "Oyster Stew" as recommended by the home economists of the U. S. Fish and Wildlife Service to serve your family on chilly days.

OYSTER STEW

1 PINT OYSTERS	$1\frac{1}{2}$ TEASPOONS SALT
$\frac{1}{4}$ CUP BUTTER OR MARGARINE, MELTED	DASH PEPPER
1 QUART MILK	PAPRIKA

DRAIN OYSTERS. ADD OYSTERS TO BUTTER AND COOK FOR 3 MINUTES OR UNTIL EDGES CURL. ADD MILK, SALT, AND PEPPER, AND BRING ALMOST TO BOILING POINT. GARNISH WITH PAPRIKA. SERVES 6.